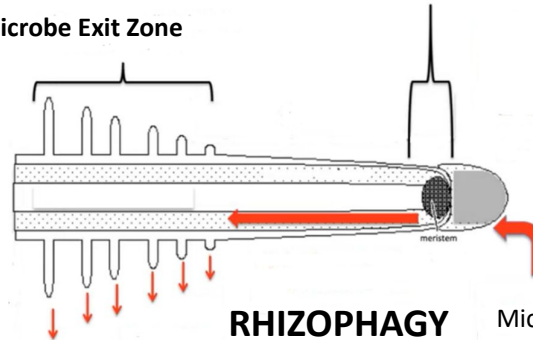


Microbes stimulate elongation of root hairs and exit at the tips of hairs where walls are thin. Microbes reform cell walls once outside root hair.

Microbe Exit Zone

Plant Cell Entry Zone - Microbes become intracellular in meristem cells as wall-less protoplasts



RHIZOPHAGY CYCLE

Microbes exit roots hairs exhausted of nutrients.

Microbes enter root cell periplasmic spaces carrying nutrients from the soil.

Microbes recharged with nutrients in the rhizosphere.

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Biological Technology



Carbohydrates

Biofilm
Quorum

CO₂
Oxidation

Metal
Oxidation

Anaerobic
Recovery

Phosphorous
Solubilising

Nitrogen
Cycling

Antibiotic
Anti-antagonist

Bio-
pesticide

Nitrogen
Fixation

Carbon
Cycling

Phytohormone
Producing

Pathogen
Control

Dam algae
remediation

Bio-remediation

Maximise quality ✓

Minimise costs ✓

Maximise yield ✓

Reduce chemical use ✓

↑Photosynthate metabolism

↑Endophytes

↑Exudates

↑Rhizosphere microbiome

↑Bio-interconnection

1. **Biological Technology:** *The microbiome is prodigious, diverse, intricate, everchanging and interconnected. Individual species are driven by intelligent self-interest and interdependence in a complex, dynamic world of matter and individual mortal species that are reciprocating, gene immortal and time congruent.*
2. **Anaerobic recovery** As plants extract nutrients from anaerobic soil, they stimulate mycorrhizal fungi to enhance nutrient uptake, altering soil chemistry and promoting aerobic conditions for healthier plant growth.
3. **Antibiotic Anti-antagonist** is the natural selection and balancing of over-abundant, pathogenic soil microorganisms with beneficial ones, thus manipulating the soil microbiome, thereby promoting the beneficial interaction of positive neurotransmitters.
4. **Bio-interconnection** refers to the intricate and interconnected relationship between plants, soil, mycorrhizal fungi, bacteria and minerals. In this dynamic ecosystem, each element plays a crucial role in promoting nutrient exchange, plant growth, and overall soil health.
5. **Bio-pesticides** are natural pest control agents that promote plant health and enhance the soil ecosystem by interacting with mycorrhizal fungi and minerals. They improve nutrient uptake, strengthen plant defences, and support beneficial microbial communities, leading to a more resilient and productive agricultural system.
6. **Biofilm Quorum** is the communication and coordination among microorganisms living within biofilms, which are structured communities of microorganisms embedded in a matrix of extracellular polymeric substances. This communication plays a crucial role in regulating nutrient exchange, pathogen defence, and soil structure, ultimately influencing plant health and productivity. Like *"Each instrument in an orchestra creating music"*
7. **Bio-remediation** is the use of biological stimulation, interacting with plants, soil microbes and minerals to degrade and remove pollutants from the environment.
8. **Carbon cycling** is the continuous exchange of carbon between the atmosphere, plants, soil, and mycorrhizal fungi. Plants absorb carbon dioxide from the air through photosynthesis and transfer it to the soil through root exudates and plant litter. Mycorrhizal fungi, symbiotic partners of plant roots, enhance nutrient uptake, promote soil aggregation, facilitate carbon sequestration in soil and increase water holding capacity.
9. **Carbohydrates**, produced by plants through photosynthesis, serve as the primary energy source for soil microorganisms, including mycorrhizal fungi. These microorganisms, in turn, facilitate nutrient uptake by plants, particularly phosphorus and nitrogen, enhancing plant growth and productivity.
10. **CO₂ oxidation** is the process by which plants convert carbon dioxide (CO₂) from the atmosphere into organic compounds during photosynthesis. This is facilitated by the mycorrhizal biome, a network of fungi that helps plants absorb nutrients from the soil. Minerals in the soil also play a crucial role in CO₂ oxidation by providing essential nutrients for plant growth.
11. **Algal bloom remediation** from fresh water algal bloom eutrophication or over-enrichment with nutrient (N, P) triggered by light and temperature; in wetlands, rivers, lakes and reservoirs; with toxic consequences, biomass accumulation and lower biodiversity.
12. **Endophytes** are microorganisms that live within plant tissues, interacting with the soil, mycorrhizal biome and minerals to enhance plant growth, nutrient acquisition and stress tolerance.
13. **Exudates** are released by root hairs into the rhizosphere, influencing soil and plant fertility, mycorrhizal activity and mineral uptake. They release intrinsic signalling molecules to activate the complex interplay of neurotransmitters including hormones, enzymes, acids and peptides.
14. **Metal oxidation** is the process by which metals in soil undergo chemical reactions with oxygen, leading to the formation of oxidized metal compounds. This process is influenced by various factors, including soil pH, microbial activity, and the presence of mycorrhizal fungi.
15. **Nitrogen Cycling:** A dynamic interplay between plants, soil, mycorrhizal fungi, and minerals, where nitrogen is converted, exchanged, and utilized for plant growth and ecosystem health.
16. **Nitrogen Fixation** is a natural process that converts atmospheric nitrogen into usable forms for plants, facilitated by a symbiotic relationship between plants, soil, mycorrhizae, and minerals.
17. **Pathogen Control** is the biological engagement to reduce the impact of harmful microorganisms that can cause diseases in plants. This involves promoting a healthy soil ecosystem, fostering beneficial interactions between plants, mycorrhizal fungi, and essential minerals, thus enhancing plant resistance to pathogens.
18. **Phosphorus Solubilizing** is the process by which microorganisms, primarily bacteria and fungi, enhance the availability of phosphorus from the soil. These microorganisms break down insoluble phosphorus forms, making them accessible for plant uptake playing a crucial role in plant nutrition and overall ecosystem health.
19. **Photosynthate metabolism** encompasses the intricate interplay between plants, soil, mycorrhizal fungi, and minerals, driving nutrient uptake and plant growth.
20. **Phyt hormone producing** is the ability of certain plants, soil organisms, and mycorrhizal fungi to produce plant hormones that regulate plant growth and development. These hormones can influence nutrient uptake, root development, stress resistance, and interactions with other organisms in the soil ecosystem.
21. **Rhizosphere Microbiome** is the complex community of microorganisms that interacts with plant roots, the soil and mycorrhizal fungi to influence plant growth, nutrient acquisition, and disease resistance.